

## Effect of FULZYME on Tomato Growth in Greenhouse

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*Bacillus subtilis* and *Pseudomonas putida* have been used widely in crop production to increase crop yields. FULZYME contains both *Bacillus subtilis* and *Pseudomonas putida* and is recommended for agricultural uses. The purpose of this experiment is to investigate the effect of FULZYME on the growth of tomato plants under greenhouse conditions.

### Material and Methods

A greenhouse experiment was conducted in Ventura, California in 2002. FULZYME, containing *Bacillus subtilis* and *Pseudomonas putida*, was applied as a soil treatment. The material was first diluted with water at 1 kilogram of material per 100 liters of water and then the diluted material was applied to the soil at 1 liter per 5 kilograms of soil. Randomized Complete Block design was employed with 3 treatments and 6 replications. Soils obtained from a strawberry farm were air-dried and crushed to pass a 2 mm screen. Eighteen 20 liter containers were filled with soil at 15 kilograms of soil per container. The treatments included the following:

Treatment	Description
Control	No FULZYME
FULZYME 1	1 Application of FULZYME
FULZYME 2	2 Applications of FULZYME at 2-week interval

The first treatment of FULZYME was applied to the soil 3 days before transplanting of tomato plants. The second treatment of FULZYME was applied to the soil 11 days after transplanting.

All the plants received the same amount of fertilizers weekly.

Sixty days after transplanting, plants were cut at the soil level and weighed for fresh weight. After washing with distilled water, plants were dried in an oven at 75°C for 24 hours and the weight was recorded as dry weight.

### Results and Discussion

Plant fresh weights are shown in Table 1. Both treatments of FULZYME increased the fresh weight of tomato plants significantly.

**Table 1. Effect of FULZYME on the Fresh Weight of Tomato Plants**

Treatment	Fresh Weight (g/plant)						Average*
	1	2	3	4	5	6	
Control	132.4	160.8	183.2	194.2	180.8	177.1	171.4 b
FULZYME 1	180.6	171.6	189.5	213.9	221.6	184.6	193.6 a
FULZYME 2	171.3	201.4	193.7	201.6	185.6	191.4	190.8 a

\*Means in a column not followed by the same letter differ significantly ( $p \leq 0.05$ ) as determined by DMRT.

There was no difference on tomato fresh weight between one and two applications of FULZYME.

Application of FULZYME significantly increased the dry weight of tomato plants (Table 2). Even though the dry weight of tomato plants that received two applications of FULZYME was higher than the dry weight of tomato plants that received one application of FULZYME, however, the increase was not statistically significant.

**Table 2. Effect of FULZYME on the Dry Weight of Tomato Plants**

Treatment	Dry Weight (g/plant)						Average*
	1	2	3	4	5	6	
Control	20.7	25.5	27.8	30.6	29.4	28.6	27.1 b
FULZYME 1	27.5	26.2	29.0	32.4	33.4	30.5	29.8 a
FULZYME 2	27.1	30.8	30.6	31.9	31.2	29.6	30.2 a

\*Means in a column not followed by the same letter differ significantly ( $p \leq 0.05$ ) as determined by DMRT.

**Table 3. Analysis of Variance of Fresh Weights of Tomato Plants**

Source of Variation	df	SS	MS	F
Treatment	2	1756.9	878.4	4.92*
Block	5	3219.3	643.9	3.61*
Error	10	1785.9	178.6	
Total	17	6762.1		

\* significant at ( $p \leq 0.05$ )

**Table 4. Analysis of Variance of Dry Weight of Tomato Plants**

Source of Variation	df	SS	MS	F
Treatment	2	34.4	17.2	6.43*
Block	5	90.5	18.1	6.76**
Error	10	26.8	2.7	
Total	17	151.7		

\* significant at ( $p \leq 0.05$ )  
\*\* significant at ( $p \leq 0.01$ )